

FINAL REPORT

Danish participation in IEA Bioenergy Task 40

2013-2015

EUDP Projekt - J.nr. 64012-0252

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**DANISH
TECHNOLOGICAL
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Summary

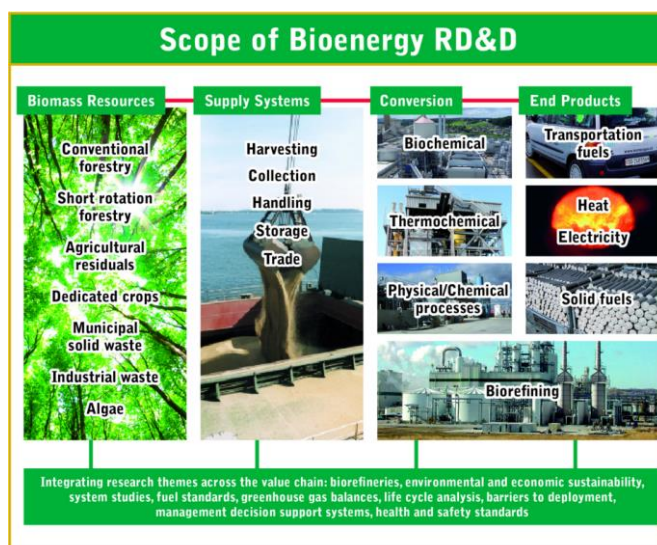
Denmark has been represented in IEA Task 40 in the past triennium (2013-2015) by the Danish Technological Institute (official representative) and HOFOR (supporting representative). Key activities have been the participation in IEA Task 40 meeting and related workshops and conference activities. DTI has been actively involved in a number of studies. Major studies where DTI has been the leading author have been an updated version of the "Country Report Denmark" in 2014 and the "Torrefaction study" that has been written in 2015 and will be published in 2016. Apart from that DTI has provided input and data specific for Denmark to the Task 40 newsletter and numerous other studies, workshops and publications within IEA Task 40.

DTI's participation in the task was supported by The Danish energy technological development and demonstration program (EUDP) under project No. J.nr. 64012-0252

IEA Bioenergy

IEA Bioenergy operates within the IEA energy technology and R&D collaboration programme. This programme facilitates co-operation among IEA Member and non-Member countries to develop new and improved energy technologies and introduce them into the market. Activities are set up under Implementing Agreements which provide the legal mechanisms for establishing the commitments of the Contracting Parties and the management structure to guide the activity. Contracting Parties can be government organisations or private entities designated by their governments. Non-IEA Member countries, or their designated entities, can become Contracting Parties.

The work of IEA Bioenergy is structured in a number of Tasks, which have well defined objectives, budgets, and time frames. The collaboration which earlier was focused on Research, Development and Demonstration is now increasingly also emphasising Deployment on a large-scale and worldwide. Each participating country pays a modest financial contribution toward administrative requirements, shares the costs of managing the Tasks and provides in-kind contributions to fund participation of national personnel in the Tasks. The scope of the work undertaken within IEA Bioenergy is shown in the graphic.



IEA Bioenergy Tasks

Each Task is led by one of the participating countries (Operating Agent) with technical effort coordinated by a Task Leader. The work is directed by the Executive Committee. For the period 2013-2015, there have been 10 Tasks. All of the Tasks have a common duration of three years.

IEA Task 40 - Sustainable biomass markets and international bioenergy trade to support the biobased economy

Objectives and scope of the task

The strongly growing demand for biomass and biofuels shows that there is a clear need to develop biomass resources and exploit biomass production potentials in a sustainable way and in different settings. In some markets, prices of biomass resources and fuels are already rising, which also cause indirect effects on price of raw material prices for e.g. the forest industry as well as on food (e.g. sugar). Biomass markets are still immature and this is particularly true for the demand side of the market; many biomass markets rely on policy objectives and incentives, and many of these policies may prove to be volatile.

Therefore, it is important that both supply and demand for biomass and energy carriers derived from biomass can develop in a balanced way, thus avoiding distortions and instability that can threaten investments in biomass production, infrastructure and conversion capacity. Our understanding of how this is best organised and managed under free market conditions needs further improvement. Existing international biomass markets have been mapped by Task 40; however, currently available analyses, statistics and modelling exercises still have limitations, and emerging new markets will require additional investigation.

The further development of a sustainable and stable, international, bioenergy market is a clearly a long-term process and this process is far from finalised –current biomass production and trade volumes are only a fraction of what they will need to become in order to fully realize the role of bioenergy as anticipated by many scenarios for 2050. Eventually, biomass products may develop into large-scale commodity markets, which could have multiple benefits, such as much improved market stability and competitive prices. On the other hand, the sustainability of large scale biomass production and trading has yet to be secured and governance of developing biomass markets is now at a critical stage. At this moment, fundamental policy choices by both developed and developing countries can still be made on how biomass markets should be steered, controlled, and governed.

As described above, essential drivers for bioenergy trade are security of supply, economics, climate change mitigation and development of rural areas (in both developing and developed countries). Biomass markets are evolving fast, but are still immature and many barriers remain.

The core objective of the Task was therefore:

‘to support the development of sustainable, international bioenergy markets and international trade, recognising the diversity in resources and biomass applications’

The work program of Task 40 in 2013-2015 consisted of the following five topics:

1. Mobilisation of sustainable biomass resources for the international market across different regions in the world.
2. Analysis of the future market demand for biomass from the broader biobased economy perspective.
3. Sustainability and certification.
4. Support of business model development for biomass supply and value chains.
5. Assisting the development and deployment of advanced analysis tools to improve the understanding of potential future market developments, implications and impacts of policies.

Similar to previous years, the desired impacts and results of the Task emphasis was laid on:

- The support of emerging new bioenergy markets and further development of existing markets, the stimulation of sustainable trade and development of pilot and demonstration projects (e.g. between the Task member countries); with a global perspective, including developing countries.
- Outreach to industry, strategic policy-makers, the general public and international circuits. An important element is increasing public awareness and understanding of perceptions of international bioenergy markets and sustainable development, since this is a vital issue for societal support of using biomass resources from other (world) regions.
- Maximisation of the collaboration with industry and market, not only in bioenergy but also in related fields such as feed and fodder market, forest industry, international logistics and certification. This will be undertaken particularly through the events organised by Task 40 (e.g. conferences and workshops).

In the period 2013-2015 Task 40 consisted as an international network of 12 IEA member countries.: The Netherlands, Austria, Belgium, Brazil, Denmark, Finland, Germany, Italy, Norway, Sweden, United Kingdom and the United States of America.

Representing parties in IEA Task 40 (2013-2015) were:

1. Austria. Representing parties: Vienna University of Technology and Wild & Partners.
2. Belgium. Representing party: VITO
3. Brazil. Representing party: University of Campinas
4. Denmark. Representing parties: DTI and HOFOR.
5. Finland. Representing party: Lappeenranta University of Technology
6. Germany. Representing parties: IINAS and DBFZ
7. Italy. Representing parties: GSE
8. Norway. Representing party: UMB
9. The Netherlands. Representing parties: RWE Essent and Utrecht University.
10. Sweden. Representing party: Svebio and Stockholm Environmental Institute
11. United Kingdom. Representing parties Imperial College and Drax
12. United States. Representing party: Idaho National Laboratories

Danish participation in IEA task 40 – years 2013 to 2015

Denmark is one of the leading countries in biomass utilization and current developments are clearly indicating that Denmark is increasingly becoming a bio based economy. The use of biomass in the industrial sector has continuously increased over the past decades and will likely increase further in the future, thus Denmark will become more depending on biomass import. Global biomass markets have diversified and become more complex over the past years making it utmost important to follow actual developments and future trends and to analyse their effects on the Danish market and for Danish end-users.

Denmark has been continuously represented in Task 40 since 2009 by The Danish Technological Institute (DTI). In the past triennium Denmark has been represented in Task 40 by DTI and HOFOR.

The DTI representatives in the past three years have been:

- Lars Nikolaisen (retired 2012)
- Jørgen Hinge (left DTI in 2015)
- Jonas Dahl (left DTI in 2015)
- Wolfgang Stelte (since 2015)

Anders Evald from HOFOR has been representing the Danish heat and power sector on behalf of all major heat and power providers in Denmark (Dong, Verdo, HOFOR).

The present representatives in task 40 at the end of the past triennium (2013-2015) and in the present task 40 are:



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Milestones of the Danish participation in Task 40 (2013-2015) were participating in various task meetings and market studies in which the global biomass markets have been analyzed and discussed and their dissemination to public and end-users in and outside Denmark.

Meetings, networking and dissemination activities

Task 40 meetings 2013-2015

11-12 March 2013	Rotterdam, The Netherlands Denmark represented by Lars Nikolaisen and Jonas Dahl
3 June 2013	Copenhagen, Denmark (hosted by DTI) Denmark represented by Jonas Dahl
27-29 October 2013	Miami, FL, United States of America Denmark represented by Jonas Dahl
15-16 January 2014	Graz, Austria Denmark represented by Jonas Dahl, Anders Evald and Lars Nikolaisen
5-6 June 2014	Lappeenranta, Finland Denmark represented by Jonas Dahl and Jørgen Hinge
23 October 2014	Brussels, Belgium Denmark represented by Jonas Dahl
4 May 2015	Sassari, Italy (Denmark not represented in meeting)
28-29 October 2015	Berlin, Germany Denmark represented by Wolfgang Stelte and Anders Evald

Other events / dissemination activities

Annual Task 40 Newsletter → Input of Danish data from DTI

Oct 2015 Workshop: Developing a bio-based economy - lessons from and implication for bioenergy trade (Berlin) → Denmark represented by Wolfgang Stelte, DTI

Aug 2015 Workshop: Examples of Positive Bioenergy and Water Relationships (Stockholm)

May 2015 Workshop: Biomass Trade and Supply in a Global Bio-Based Economy (Sassari)

Apr 2015 Session: "Visions for bio-energy trade in the Baltic Sea region in a ten year perspective", Conference Nordic Baltic Bioenergy (Riga)

Jan 2015 Workshop: Biomethane International, 12nd International Conference on Biofuels (Berlin)

Oct 2014 Workshop: Towards sustainable international biomass trade strategies, (Brussels) → Denmark represented by Jonas Dahl, DTI

Jun 2014 Workshop: Workshop Biomass trade & supply system opportunities in a world-wide bio-based economy, (Jonkoping, Sweden)

Jan 2014 Workshop: Torrefaction of Biomass, (Graz, Austria) → Denmark represented by Jonas Dahl and Wolfgang Stelte, DTI

Oct 2013 Workshop: The Transatlantic Trade in Wood for Energy: A Dialogue on Sustainability Standards (Savannah, GA)

Oct 2013 Workshop: Task 40 Technical Workshop at the USIPA Conference (Miami, FL) → Denmark represented by Jonas Dahl, DTI

Mar 2013 Workshop: How can sustainability certification support bioenergy markets? 8th Annual WBM Conference (Rotterdam) → Denmark represented by Lars Nikolaisen and Jonas Dahl

Studies made under the lead or key-participation of DTI

Country report Denmark (updated 2014): The Task 40 country reports identify domestic biomass resources in each member countries, and their current use, trends, and main users. In the reports, policy support and expected biomass use in 2020 (and beyond) is also described, together with biomass prices and international biomass trade for energy. Finally, discussions on drivers, barriers & opportunities are also presented.

Torrefaction study - Possible effects of torrefaction on biomass trade (will be published in spring 2016): The study outlined the current market situation for energy carriers based on torrefaction technology in great detail. Production facilities, main market actors and market situation, latest technical developments in torrefaction technology, Handling and storage of torrefied biomass, price and market development, competitors and price drivers

All studies/publication made in Task 40 in the period 2013-2015

List of publications (by years)

Year 2014 / 2015

Country reports (updated in 2015)

**T40
Country
Report** [Austria 2011; 2014](#) | [Belgium 2011](#) | [Brazil 2011; 2014](#) | [Canada 2011 ; 2014](#) | [Denmark 2011; 2014](#) | [Finland 2011; 2014](#) | [Germany 2011 ; 2014](#) | [Italy 2011](#) | [Japan 2011](#) | [Netherlands 2011 ; 2014](#) | [Norway 2011; 2014](#) | [Sweden 2011; 2014](#) | [United Kingdom 2011](#) | [United States 2010; 2014](#) |

Task 40 compile country reports for the year 2011 and 2014. These country reports identify domestic biomass resources in each member countries, and their current use, trends, and main users. In the reports, policy support and expected biomass use in 2020 (and beyond) is also described, together with biomass prices and international biomass

trade for energy. Finally, discussions on drivers, barriers & opportunities are also presented.

Country reports 2009 can be found [here](#).

The 2014 Canadian country report was published by CanBio. While Canada is currently not a member of IEA Bioenergy Task 40, the information is presented in a similar format as previous country reports from Canada, and may be of interest for the international bioenergy trade community, as Canada is a major exporter of wood pellets. However, please note that IEA Bioenergy task 40 has not reviewed the study and is not responsible for the content.

Ecological sustainability of wood bioenergy feedstock supply chains: Local, national and international policy perspectives



Download The report first provides a brief overview of development of policy and criteria related to sustainability of bioenergy in the EU and in key biomass importer Member States (United Kingdom, the Netherlands and Belgium). The following sections then provide an thorough review of policy, regulations and practices of Canada and the United States, with a special focus of key biomass producing provinces/states (British Columbia, Ontario and Quebec in Canada, Georgia, New York and Massachusetts and California in the US); this in-depth analysis of the Canadian and American contexts was made possible due to the abundance of information available for those countries, but was also found necessary due to the

scarcity of syntheses on this information. The next section then provides an overview of the policy and practices for land and forest management in Russia, with a focus on the region of Northwest Russia, based on the information that was possible to gather from this area. The report concludes with a discussion and main conclusions stemming from the analysis of the case studies.

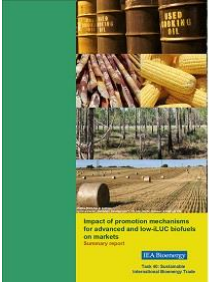
Biomethane - Status and Factors Affecting Market Development and Trade



Download A new report, "Biomethane: Status and Factors Affecting Market Development and Trade", published in September 2014, was prepared jointly by Task 40 and Task 37 to address the status and emerging challenges of dealing with the rapid growth of production of biomethane, by either anaerobic digestion or thermal gasification, the developing biomethane market and trade of the gaseous biofuel. The aim of this study is to provide an up-to-date overview of the status of biomethane (including upgraded biogas and bio-SNG) production, grid injection and use in different countries, and to illustrate the options and needs for the development of larger biomethane supply strategies. The focus is on

technical, economic and management- related hurdles to inject biomethane into the natural gas grid and to trade it transnationally. The study provides insights into the current status of technologies, technical requirements and sustainability indicators as well as cost of biomethane production and use in general and especially in selected countries. It also assesses implementation strategies, market situations and market expectations in selected countries, and proposes actions to be taken to reduce barriers and to develop the market step-by-step.

Impact of promotion mechanisms for advanced and low-iLUC biofuels on markets



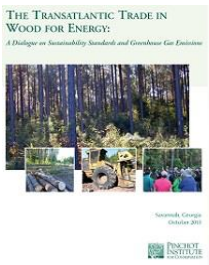
With current discussions on indirect effects of biofuels, and the aim to broaden feedstocks to non-food biomass, policies are trying to put focus on biofuels from waste, residues and lignocellulose materials, so called 'advanced' biofuels. Next to the general biofuel incentives, these biofuels are getting extra support through specific promotion mechanisms. Examples are the double-counting mechanism for advanced biofuels in the EU, and the specific targets for advanced biofuels in the US. In this study, some typical cases are presented where promotion mechanisms for advanced biofuels have had an impact on markets and trade (used cooking oils and animal fats, sugarcane ethanol), or may be anticipated to impact markets and trade in the future (straw, wood pellets). General conclusions and summaries of the four case studies can be found in a summary report. [Download summary](#).

The selected cases are:

1. Used cooking oils and animal fats for biodiesel: impact of the double-counting mechanism for advanced biofuels in the European Renewable Energy Directive on market prices and trade flows, analysed for the Netherlands and Italy. [Download report](#).
2. Sugarcane ethanol: impact of the subtargets for specific advanced biofuels in the US Renewable Fuels Standard (RFS2), where sugar cane ethanol is classified as 'advanced biofuel'. This has had a clear impact on prices and trade patterns between Brazil and the US. [Download report](#).
3. Crop residues (straw) for bioenergy: straw may play an important role for advanced biofuels in the future. In countries such as Germany, Denmark or Poland, this is an emerging feedstock for energy and biofuels. There are already some experiences we can take into account from the promotion of straw for stationary energy, e.g. in Denmark. [Download report](#).
4. International trade of US wood pellets for bioenergy in the EU: Renewable Energy promotion in certain EU Member States is causing considerable trade flows from the US to the EU. There is clear that there are interactions with existing wood markets and forestry practises. In the future there may be additional effects when demand for cellulose-based biofuels enters these markets. [Download report](#).

Year 2013

The transatlantic trade in wood for energy: A Dialogue on Sustainability Standards and Greenhouse Gas Emissions



[Download](#) The Savannah workshop was a unique opportunity to bring together a broad spectrum of stakeholders to evaluate sustainability issues - particularly biomass sourcing options - at a critical moment in the development of the global wood pellet trade. A key objective was to increase the collective understanding of sustainable procurement options already in use in the South and how these systems match up to European demand. Connections among participants were strengthened for future cooperation in hopes of establishing meaningful sustainability criteria. These connections are key to informing ongoing processes such as the deliberations of the Sustainable Biomass Partnership and

governmental bodies throughout Europe and North America.

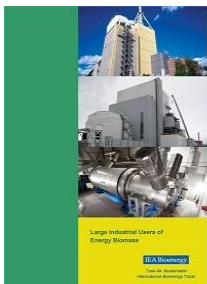
Sustainable Biomass and Bioenergy in the Netherlands - Country Report 2013



[Download](#) NL Agency commissioned Utrecht University's Copernicus Institute, leader of the IEA Bioenergy Task 40 workgroup on biomass trade, to perform the analyses for this year's annual report on Dutch biomass trade. The detailed report reviews the entire biomass arena as perceived from the Dutch context. Distinguishing between wood-based biomass flows, oils and fats and carbohydrates, and with much attention paid to the current push towards certification, the report is a must-read for all those involved in the biomass arena at the strategic level. The editors also provide an extensive framework for the monitoring and providing guidance to the growing biomass industry.

EU in the spotlight: New in this edition is an attempt at a comparative review of global imports and exports for ten leading commodities - with an emphasis on comparative data concerning the EU. The report shows that the EU continues to be a champion of biofuels and biomass imports, surpassing the US in imports of biodiesel and wood pellets. [Link the news](#).

Large Industrial Users of Energy Biomass



[Download](#) The objective of the study is to obtain a global overview of the biomass use in industrial and transport sectors and to compose lists of the largest users of energy biomass in the world. Various statistics, databases, reports, and reviews, most of them publicly available, have been utilised during the study to examine plants that either refine biomass for use in transportation and heating purposes or plants that convert biomass into heat and power. The plant lists presented are based on the prevailing situation in the end of the year 2012; due to lack of comprehensive and accurate plant-specific information and rapidly changing situation, the results should be used with care.

Future Perspectives of International Bioenergy Trade

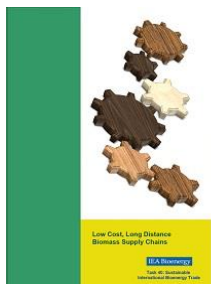


[Download summary](#) This study aims to provide insight into "possible futures" of bioenergy trade and discuss implications and challenges related to different developments. The sub-objectives of this study are:

- Investigate to which extent various global energy models and scenarios take into account bioenergy trade,
- Identify the implications of different global bioenergy scenarios on bioenergy trade,
- Summarize the range of results into 3-5 storylines of future international bioenergy trade.

The insight into future scenarios and perspectives of bioenergy trade revealed that substantial challenges for the future development of global and international bioenergy trade may be expected in the coming decades if a low carbon energy system is to be developed. The theoretical and technical biomass potentials in many models are often quite optimistic, and sustainable biomass potentials are only included to a limited extent, as these are often hard to quantify and are also not the main aim of the models. It remains to be seen how global, stringent mandatory sustainability requirements (e.g. on water use, biodiversity, forest carbon accounting and iLUC) would limit the production, trade and use of feedstocks in the first place, but also how practical certification of biomass would affect bioenergy trade.

Low cost, Long Distance Biomass Supply Chains (Revised in April 2014)



[Download](#) This report focuses on long-distance biomass supply chains, including ground-based supply of raw biomass to densification plants, and transportation of densified biomass to ports in other continents. It aims to: (i) provide an overview of the characteristics of three densified biomass forms; solid wood pellets, solid torrefied wood and liquid pyrolysis oil; for these; (ii) outline existing and future markets and specific supply chains for these products and explore large sources of biomass worldwide, some well-established and already being developed either for local use or trade, some only identified as a possible future potential source; (iii) highlight the importance of the costs of logistics in biomass supply chains; (iv)

illustrate current cost structures of existing long-distance biomass supply chains, and (v) explore how the cost of current and future long-distance supply chains of wood pellets, torrefied pellets and pyrolysis oil could be lowered, and what this would require from the stakeholders involved.

The Science-Policy Interface on the Environmental Sustainability of Forest Bioenergy

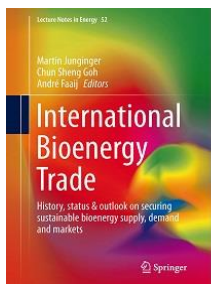


[Download](#) This publication reports on the discussions and opinions expressed during an expert workshop on the environmental sustainability of forest bioenergy in Canada, held in Quebec on the 3-5 October 2012.

The workshop was organised by the International Energy Agency Bioenergy Task 40 (International Sustainable Bioenergy Trade) and Task 43 (Biomass Feedstocks for Energy Markets), the IEA Bioenergy Executive Committee, the Faculty of Forestry, Geomatics and Geography of Laval University (Quebec, Canada), and Natural Resources Canada, with collaboration from the Global Bioenergy Partnership and

the Canadian Council of Forest Ministers. Participants engaged in dialogue critical for the formulation of rational policy to achieve sustainable forest bioenergy production systems.

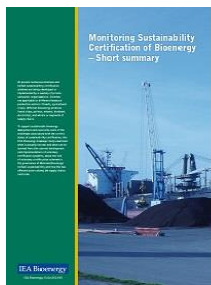
Book: International Bioenergy Trade: History, status & outlook on securing sustainable bioenergy supply, demand and markets



The trade of global bioenergy commodities, such as ethanol, biodiesel and wood pellets has been growing exponentially in the past decade, and have by 2013 reached true "commodity" volumes, i.e. tens of millions of tonnes traded each year, and billions (both in US\$/EUR) of annual turnover. IEA Bioenergy Task 40 was founded in 2004 and is now in its 4th triennium. For the past 9 years, task 40 has monitored the developments in international bioenergy trade, including the organization of about 20 workshops on trade-related topics, and the publication of over 100 studies, country reports, newsletters, etc. The amount of material produced over the years and insights gained in how biomass markets and

international trade of biomass and biofuels has developed is impressive. Besides that the group has produced overviews and insights, also a large amount of practical experience has been brought together in what works and what doesn't. Last but not least, based on all this, there are clear(er) views on how to proceed to build working sustainable international biomass markets in the future. This book compiles those lessons and insights into an easily accessible book publication. More information on the book available at [Springer website](#).

Monitoring Sustainability Certification of Bioenergy



At present numerous biomass and biofuel sustainability certification schemes are being developed or implemented by a variety of private and public organisations. This induces multiple challenges, e.g. confusion among actors involved, fear of market distortion and trade barriers, an increase of commodity costs, questions on the adequacy of systems in place and uncertainty over how to develop systems that are effective and yet cost-efficient. To support sustainable bioenergy deployment and overcome some of the challenges mentioned above, this IEA Bioenergy strategic study examined what is actually known and what can be learned from the current development and implementation of voluntary

certification systems, about the role of voluntary certification schemes in the governance of biomass/bioenergy/biofuels sustainability and how this has affected actors along the supply chains and trade. [Download short summary](#).

The study has produced four reports,

1. Examining sustainability certification of bioenergy (task 1) [Download](#)
2. Survey on governance and certification of sustainable biomass and bioenergy (task 2) [Download](#)
3. Impacts of sustainability certification on bioenergy markets (task 3) [Download](#)
4. Recommendations for improvement of sustainability certified markets (task 4) [Download](#)

All minutes from Task 40 meetings, newsletters and published studies can be accessed on the task 40 website

<http://www.bioenergytrade.org/>